

High-Definition Multimedia Interface

Version 2.0

Quantum Data MOI v1.2

Test ID: HF1-13

October 1, 2015

Preface

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Document Revision History

- 1.1 April 23, 2015 – Added text to indicate approval with limited scope.
- 1.2 October 1, 2015 – Removed text indicating approval with limited scope (now fully approved).

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Contact Information

The URL for the HDMI Forum web site is: <http://www.hdmiforum.org/>

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Introduction

This document provides a set of Method of Implementation for test method described in HDMI Compliance Test Specification Version 2.0 (HDMI CTS 2.0). HDMI Forum created HDMI CTS 2.0 to specify a set of tests that should be performed to verify features described in HDMI Specification Version 2.0.

Scope

This document provides testing procedures for HDMI CTS 2.0 Test ID HF1-13: “Source TMDS Protocol Scrambling $\leq 3.4\text{bps}$.” The procedure below deals with single resolution and only one Test ID is considered at a time.

References

Normative References

High-Definition Multimedia Interface Specification Version 1.4b, October 11, 2011.
HDMI Compliance Test Specification Version 1.4b, October 11, 2011.
High-Definition Multimedia Interface Specification Version 2.0, August, 2013.
HDMI Compliance Test Specification Version 2.0.

Informative Reference

No additional informative references.

Test ID HF1-13: Source TMDS Protocol Scrambling <= 3.4bps

Objective

Confirm that the Source enables/disables scrambling according to the scrambling capability of the connected Sink for TMDS Character Rates at or below 340Mcsc.

Table 7-19 Source TMDS Protocol - 6G – Scrambling ≤ 3.4Gbps Requirements

Reference	Requirement
[HDMI: 2.0: 6.1.2] Scrambling for EMI/RFI Reduction	<See reference for details>
[HDMI 2.0: 6.1.3.1] Scrambling Control	<See reference for details>

Capability(s)

The Source DUT supports scrambling.

Test Equipment

Item	Generic Equipment	Vendor Specific Equipment	Quantity
1	HDMI 2.0 Protocol Analyzer	980 Advanced Test Platform series: 980 HDMI 2.0 Protocol Analyzer module HDMI CTS 2.0 Compliance Test Package #3	1

Generic Procedure

Setup:

- 1 Connect the Source DUT to the Protocol Analyzer.
- 2 For any one of the following Video Timings, perform the following test:
 - 720x480p 59.94/60Hz.
 - 720x576p 50Hz.
- 3 If the CDF field Source_LTE_340Mcsc_Scrambling is “Y”, then perform the following:
 - 3.1 Configure the EDID, which indicates the support of scrambling for TMDS Character Rates at or below 340Mcsc.
 - 3.2 Operate the Source DUT to output the tested format.
 - 3.3 Perform Test ID HF1-11 and Test ID HF1-12 from Step 2 in Section 7.2.2 using the tested format.
 - 3.4 If any test item fails, then FAIL.

- 3.5 Configure the EDID, which indicates the non-support of scrambling for TMDS Character Rates at or below 340Mcsc.
 - 3.6 Operate the Source DUT to output the tested format.
 - 3.7 If the Source DUT does not write 0 to the Scrambling_Enable bit, then FAIL.
 - 3.8 Operate the Protocol Analyzer to decode the captured data as a non-scrambled signal. If the decoding process is not performed correctly, then FAIL.
- 4 If the CDF field Source_LTE_340Mcsc_Scrambling is “N” and the CDF field Source_Above_340 is “Y”, then perform the following:
- 4.1 Configure the EDID, which indicates the support of scrambling for TMDS Character Rates at or below 340Mcsc.
 - 4.2 Operate the Source DUT to output the tested format.
 - 4.3 If the Source DUT does not write 0 to the Scrambling_Enable bit, then FAIL.
 - 4.4 Operate the Protocol Analyzer to decode the captured data as a non-scrambled signal. If the decoding process is not performed correctly, then FAIL.

Vendor Specific Test Procedure

Test Equipment

A variety of equipment is needed for testing HDMI products. Each piece is authorized and included by name in this Compliance Test Specification. This section describes the Quantum Data test equipment.

HDMI 2.0 Protocol Analyzer module

The Quantum Data 980 HDMI 2.0 Protocol Analyzer module can be installed in the 980B or 980R series Advanced Test Platforms. This 980 HDMI 2.0 Protocol Analyzer module serves the generic test functions called out in the HDMI 2.0 Generic CTS. Refer to the table below:

Item	Quantum Data Equipment	
1	980 Advanced Test Platform series:	
	Equipped with:	980 HDMI 2.0 Protocol Analyzer module
		HDMI CTS 2.0 Compliance Test Package #3

980 HDMI 2.0 Protocol Analyzer Module with 980 Series Platform Configurations

The figures below show depictions of the 980 HDMI 2.0 Protocol Analyzer module equipped in various 980 series platforms. **Note:** Card positioning may vary depending on configuration.



Source TMDS Protocol Scrambling

Test ID HF1-13 - Source TMDS Protocol Scrambling <= 3.4bps

1. Objective

Confirm that the Source enables/disables scrambling according to the scrambling capability of the connected Sink for TMDS Character Rates at or below 340Mcsc.

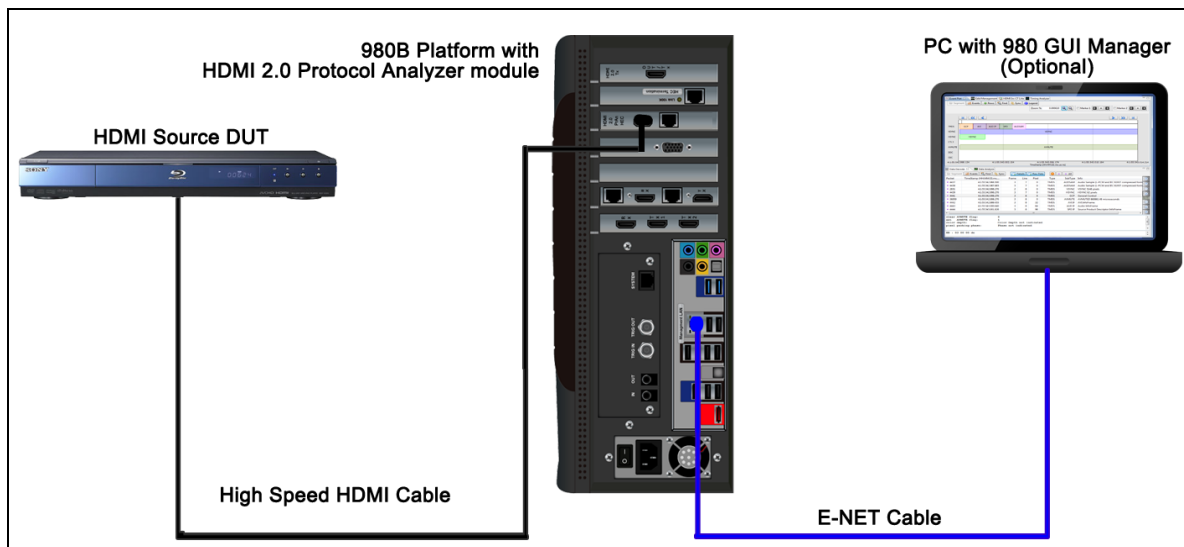
2. Test Overview

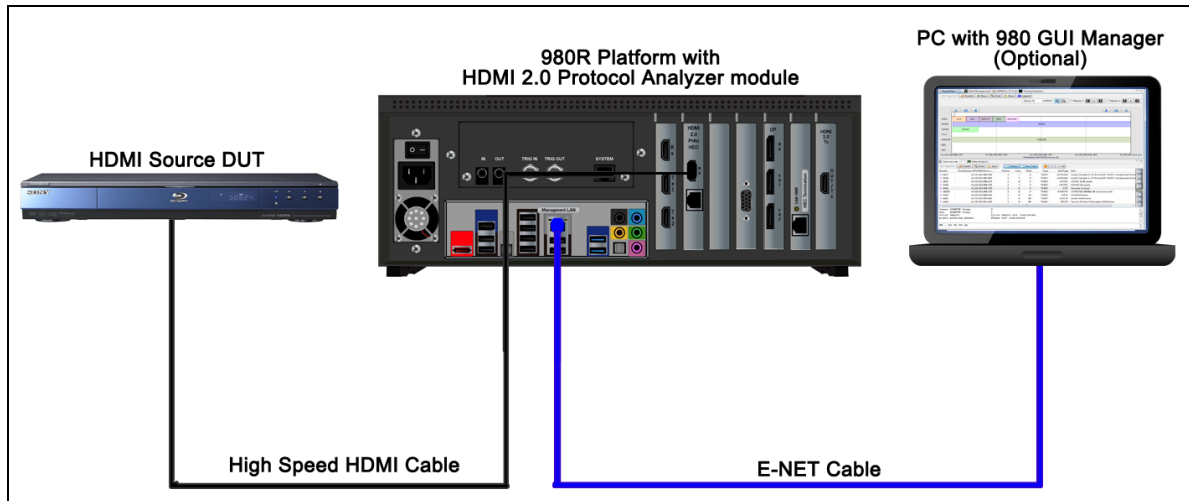
The Pass/Fail criteria is assessed by the application with no human examination required.

3. Procedure

Use the following procedure to conduct this test.

- 1 Connect Source DUT to the Quantum Data 980 HDMI 2.0 Protocol Analyzer at the module's port labeled Rx. Use a High Speed HDMI cable. The figures below show depictions of connections to the 980 HDMI 2.0 Protocol Analyzer module residing in the 980 series chassis.

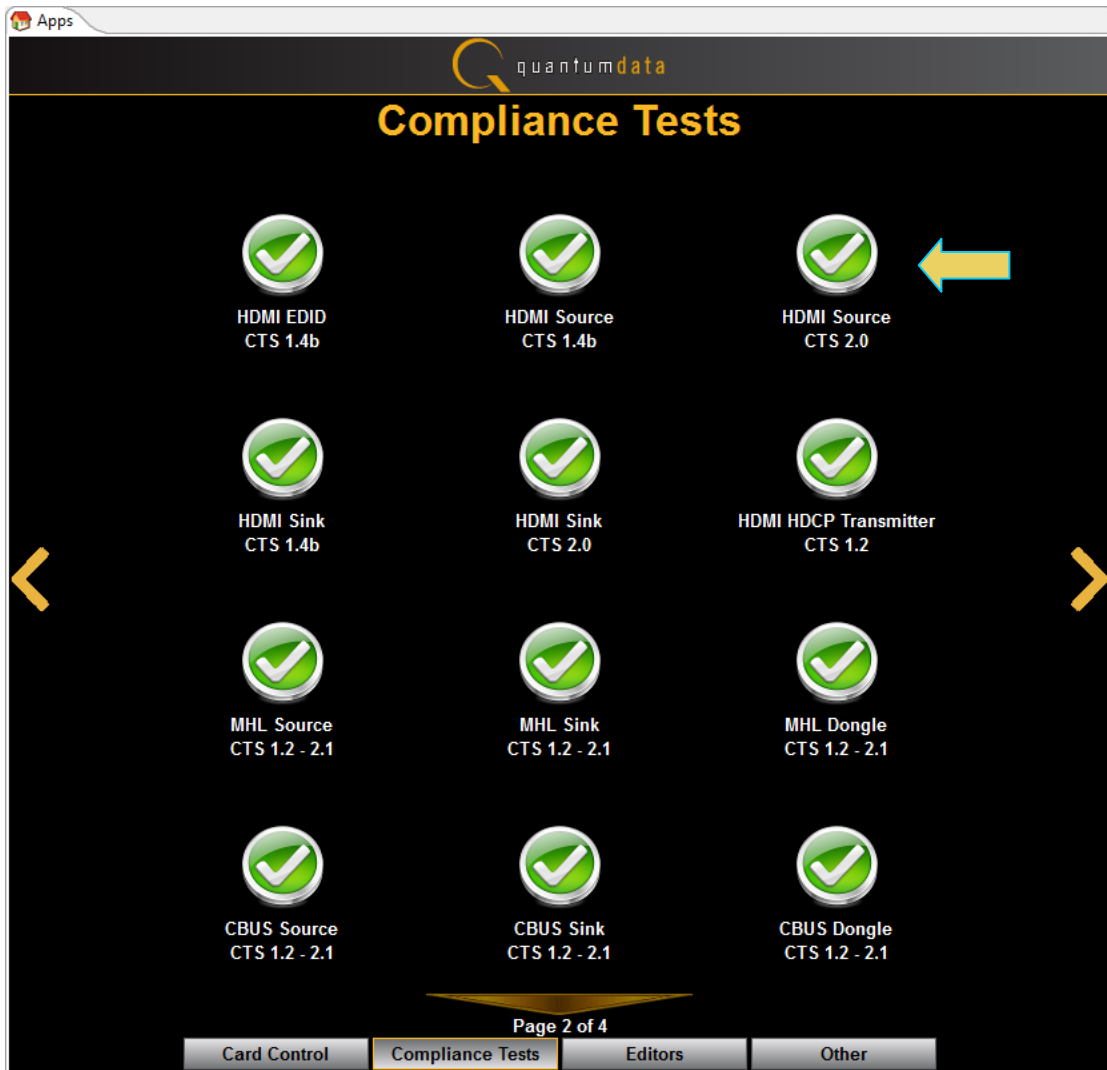




- 2 Operate the Source DUT to output the tested format.
- 3 Use Quantum Data 980 Embedded Manager GUI (touchscreen) or invoke Quantum Data 980 External Manager GUI (Windows application).

Note: You will not need to connect the PC shown in the figures above if you are running the compliance test through the 980's embedded display. The PC running the 980 HDMI Protocol Analyzer module's compliance test application is connected to the 980 through a standard Ethernet cable.

- 4 Complete the following steps:
 - 4.1 Click on the HDMI Source CTS 2.0 icon in the Compliance Tests page of the Apps panel.



- 4.2 Navigate to the CDF tab if not already there. If there is a saved CDF file, then click on Open and select it. Otherwise, enter the DUT's CDF information for each tab and optionally click on Save to save the CDF.

HDMI 2.0 Src CT 2.0

CDF Entry | Selection | Test Options / Preview

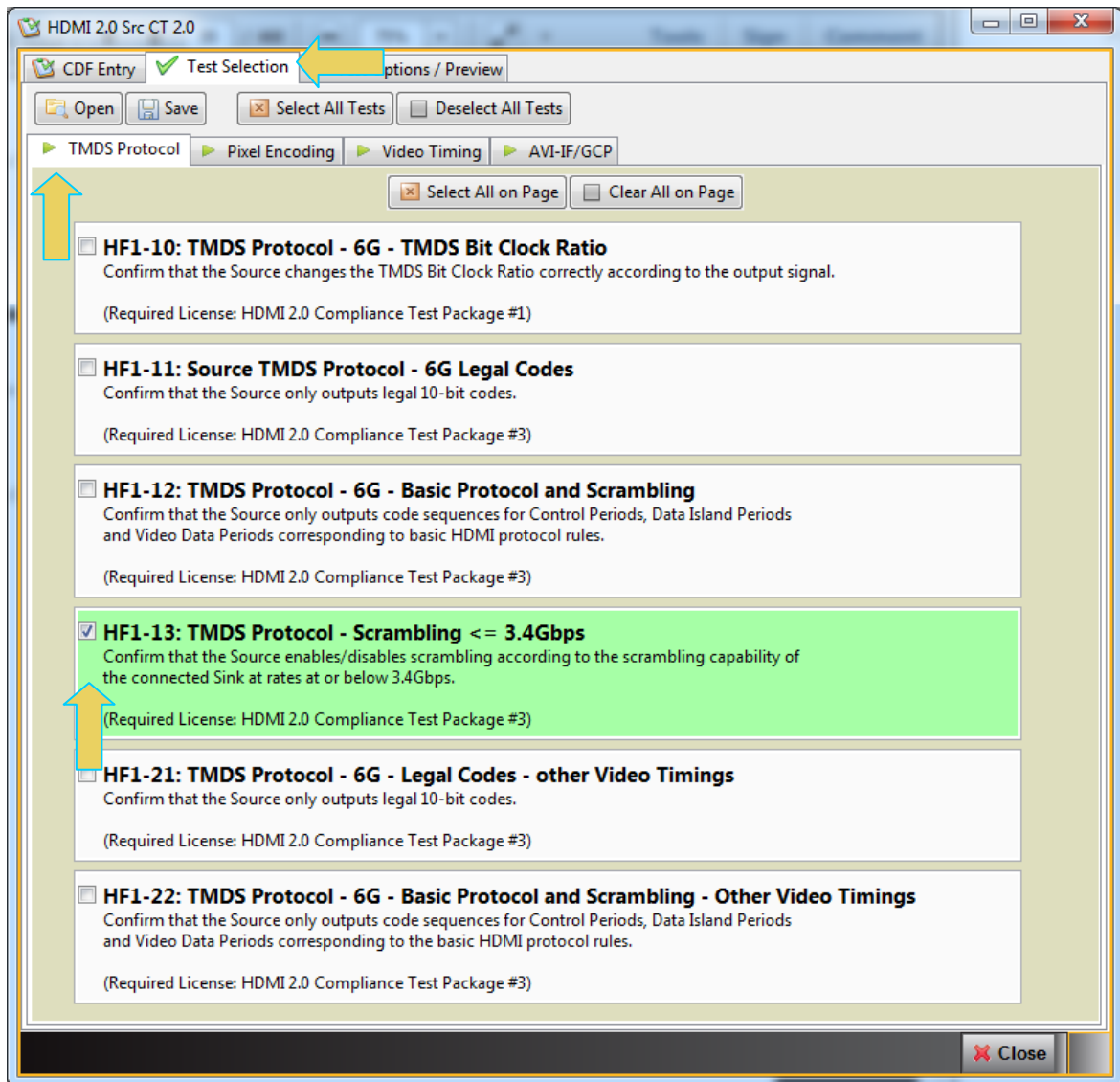
Open | New | Save | CDF File: /CDF/XYZ_Source

General | Y420 Video | 21:9 (64:27) Video | 6G Video | non2160p Timings

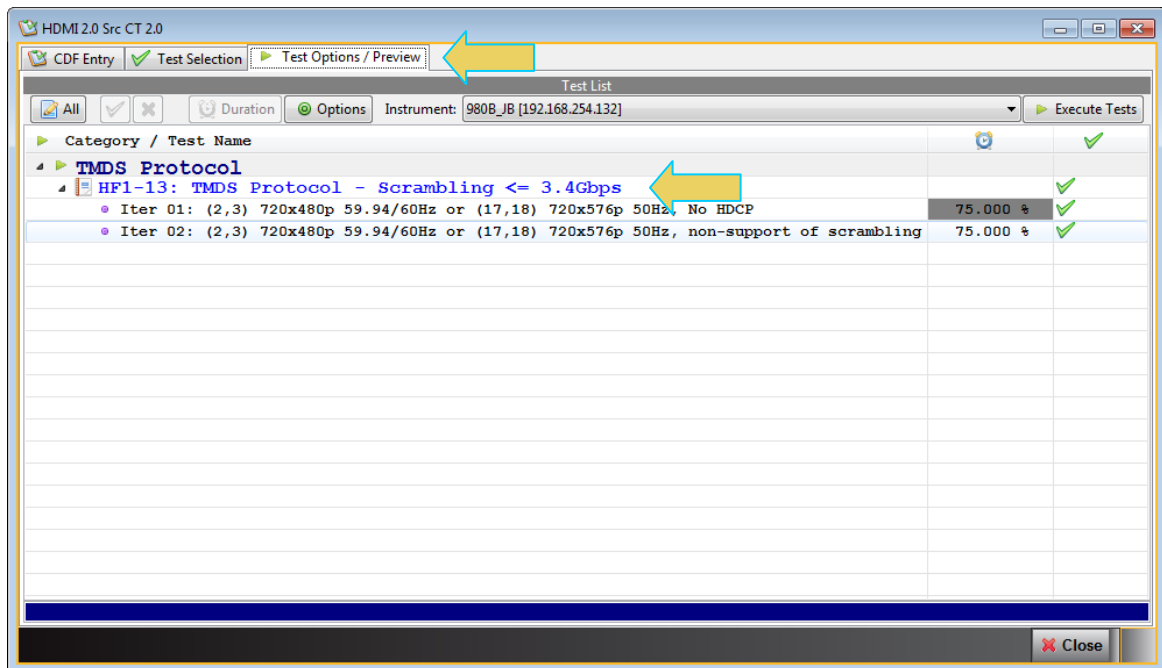
Source_ITURBT_2020_101	Does the DUT support ITU-R BT.2020 Y'CC'BCC'RC Colorimetry?	<input type="radio"/> Yes <input checked="" type="radio"/> No
Source_ITURBT_2020_110	Does the DUT support ITU-R BT.2020 Y'C'BC'R Colorimetry?	<input type="radio"/> Yes <input checked="" type="radio"/> No
Source_LTE_340Msc_Scrambling	Does the product support scrambling for TMDS Character Rates at or below 340Msc?	<input checked="" type="radio"/> Yes <input type="radio"/> No
Source_Above_340	Does the product support any Video Format/color mode for TMDS Character Rate above 340Msc up to 600Msc?	<input checked="" type="radio"/> Yes <input type="radio"/> No
Source_2160p_Video_Formats_Above_340		
(96) 3840x2160p @ 50 Hz 16:9		<input checked="" type="radio"/> Yes <input type="radio"/> No
(97) 3840x2160p @ 60 Hz 16:9		<input checked="" type="radio"/> Yes <input type="radio"/> No
(101) 4096x2160p @ 50 Hz 256:135		<input type="radio"/> Yes <input checked="" type="radio"/> No
(102) 4096x2160p @ 60 Hz 256:135		<input type="radio"/> Yes <input checked="" type="radio"/> No
(106) 3840x2160p @ 50 Hz 64:27		<input checked="" type="radio"/> Yes <input type="radio"/> No
(107) 3840x2160p @ 60 Hz 64:27		<input checked="" type="radio"/> Yes <input type="radio"/> No
Source_2160p_DC_Video_Formats_Above_340		

Close

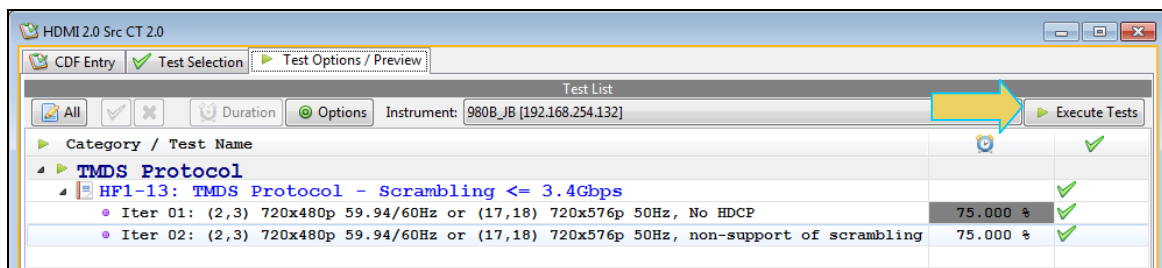
- 4.3 Click on the Test Selection tab and the TMDS Protocol sub tab and select the HF1-13 Source TMDS Protocol – Scrambling <= 3.4Gbps Test. Refer to the sample screen below.



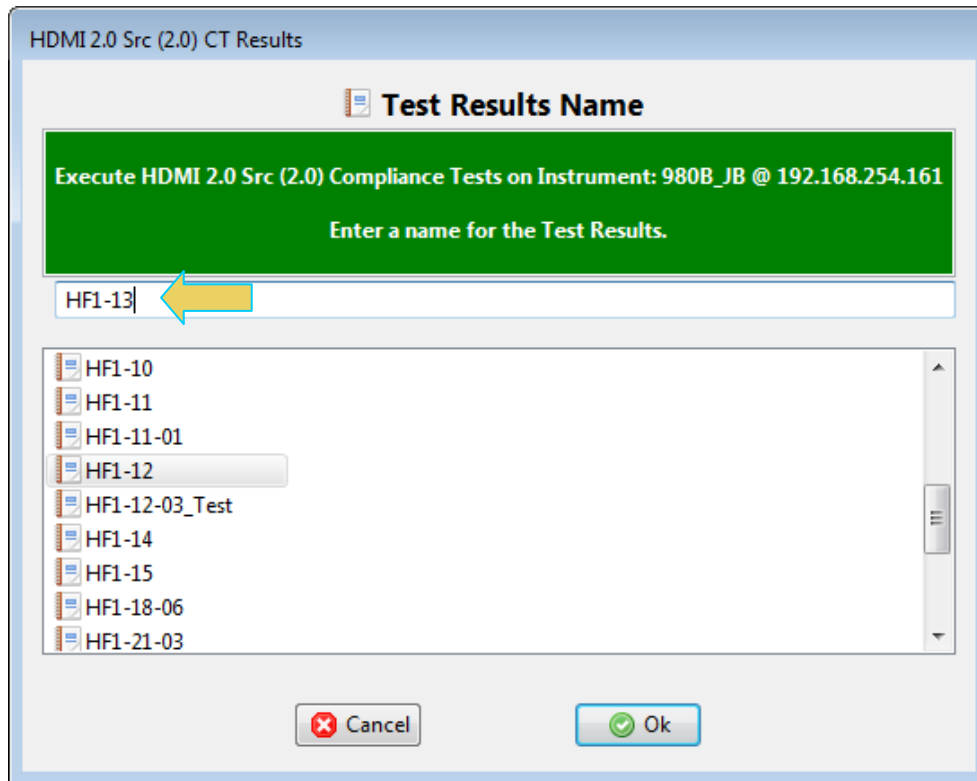
- 4.4 Click on Test Options / Preview tab and review the list of tests. Refer to the sample screen below.



- 4.5 Click on Execute tests activation button to initiate the test. Refer to the sample screen below.

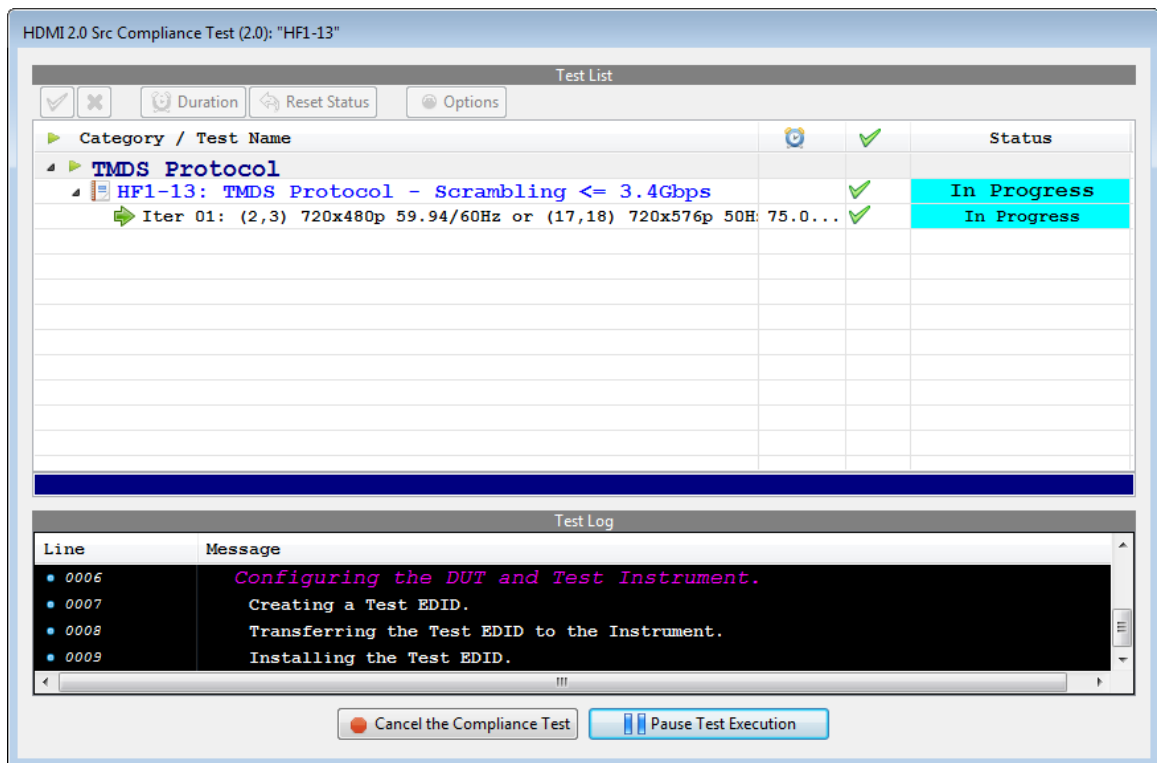


Note: You will be prompted with a dialog box to assign a name to the test results. Refer to the screen example below:

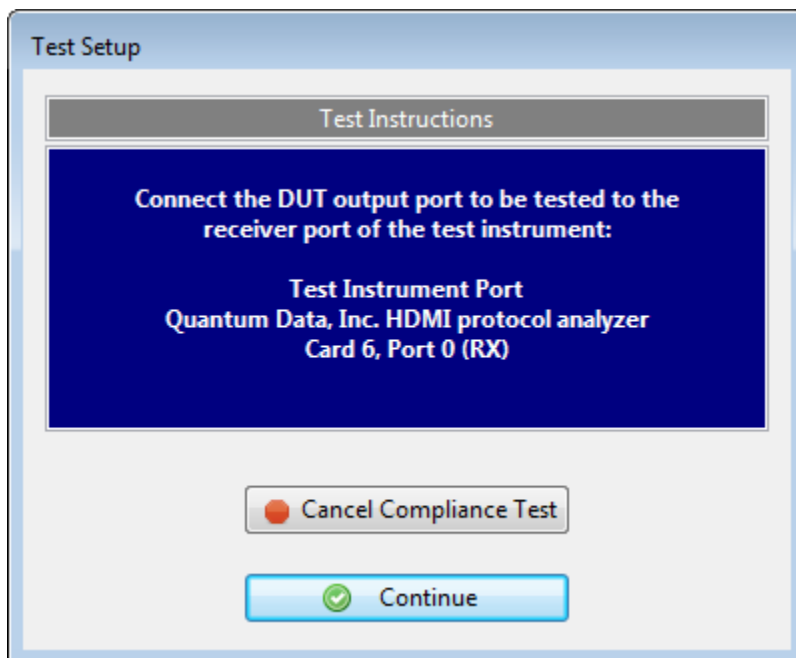


Enter a name, click OK and the test will begin.

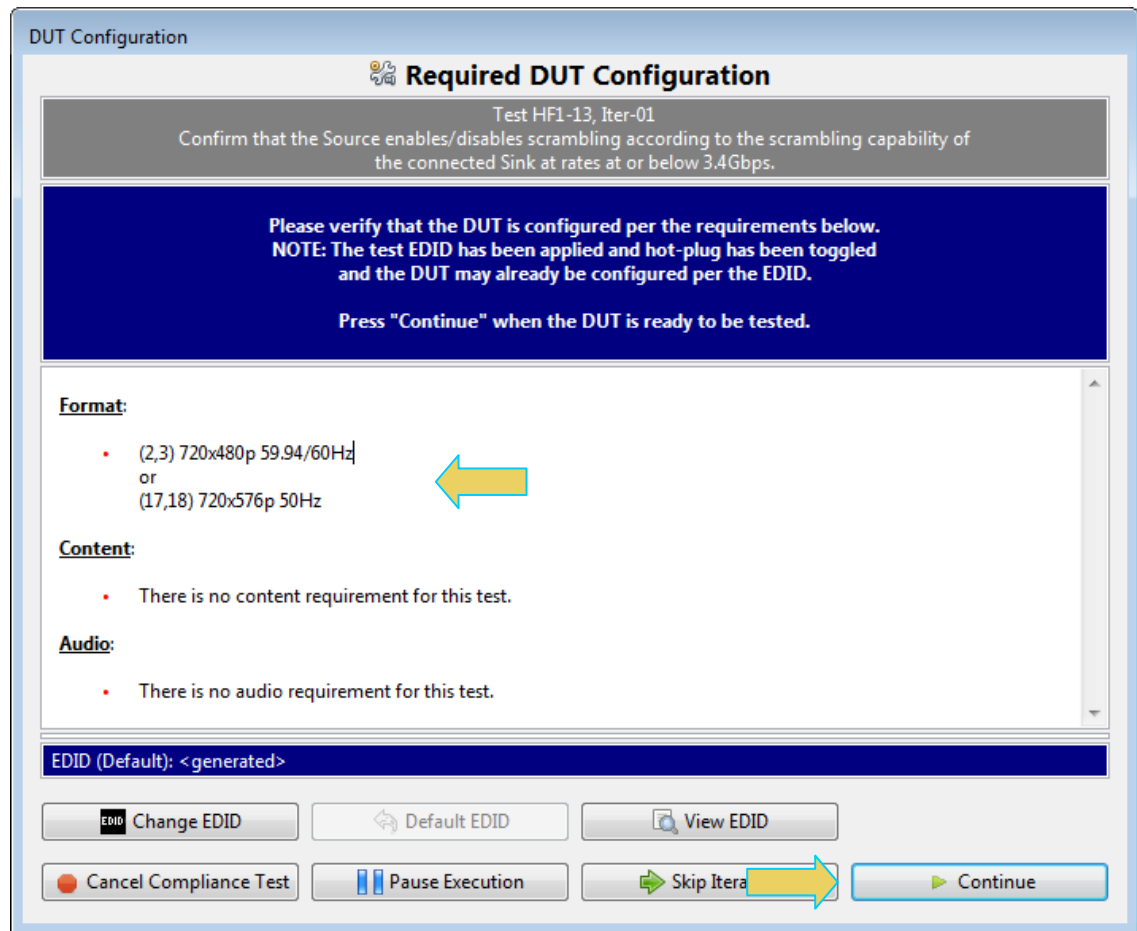
A Test Window will appear (below) indicating the progress of the test.



A dialog box will appear (below) indicating the test setup.



You will be prompted with a series of dialog boxes informing you of the requirements of the source DUT. Verify that the source is outputting the required HDMI format and pixel encoding and press Continue to run the test.



- 5 If the 980 HDMI Protocol Analyzer's compliance test application reports PASS, then PASS.
If the 980 HDMI Protocol Analyzer's compliance test application reports FAIL, then FAIL.

